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NON-CONTACT CONTROL SENSOR BY RAILWAY STOCK DEVELOPMENT CONTROL DEVICE

Abstract. In this article, on the basis of the non-contact derailment and under-gauge detection device, it is possible to detect and control the derailment of wheel pairs of the rolling stock and the under-gauge parts of the rolling stock (in the train) and when the device is activated, the train will be stopped at the station or artificial structure (tunnel, bridge) designed to stop in front. The control sensor of the non-contact rolling stock derailment and under-gauge control device receives and uses information from infrared sensors and electromagnetic road sensors, the operation of this system as a control sensor without metal elements, which in turn increases the reliability of the device, economic efficiency, as well as the costs of maintenance and systematic use of the device are reduced.

Key words: Electrical centralization, microprocessor, rolling stock, convergence, lower dimension, wireless network, non-contact, derailment, lower clearance, infrared sensor, software, track sensor.

Introduction. The rolling stock derailment control device (RSDCD) is designed to control the parts of the rolling stock (on the train) protruding from the lower gauge, as well as the wheel pair leaving the railway, and when the device is activated, to stop the train in front of the station or artificial structure (tunnel, bridge). Voice information of the informant, transmitted by the train radio communication channel or by the railway station attendant (hereinafter - RSA) by the driver, in front of the prohibitive signals of the entry, crossing, blocking or blocking traffic lights, when details that deviate from the lower gauge are detected in the train with the help of RSDCD or when a pair of wheels falls off the rails. the train is stopped through [2].

HFRC is installed before entering stations, man-made structures, rivers, canals, bridges and tunnels [3].

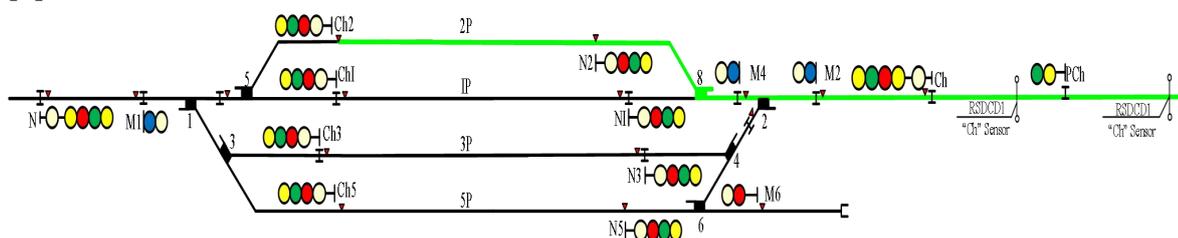


Figure 1. Schematic view of the RSDCD

RSDCD is designed for automatic detection of parts protruding from the lower gauge and wheel pairs leaving the railway track, as well as control of derailment of railway rolling stock in trains, train movement on the railway, designed to stop the train in front of the railway station or artificial structures. is considered an additional tool to ensure safety [6].

Control devices (sensors) as the main elements of the HHICHNKK are installed on the wooden sleeper at a distance of not less than 1 meter from the insulated connection (stud) on the basis of

mounting brackets. Concrete sleepers of railways are installed on wooden sleepers instead of reinforced concrete sleepers [7].

Sensors consist of two bases and a bracket. The base of the sensor is fixed to the wooden crossbar with road syrups. The sensor bracket is fixed to its base with bolts. For electrical connection of sensors with each other and with cable coupling, cable connectors (peremychka) and metal plates are used [38]. The breaking strength of the RSDCD sensor bracket should be 40-42 kN.

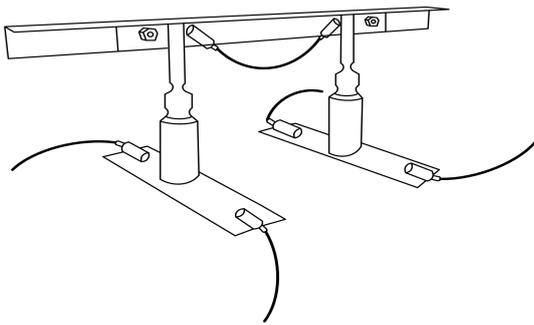


Figure 2. RSDCD sensor

It is necessary to connect RSDCD sensors with relay cabinets or junction boxes with two separate cables.

RSDCD sensor has the following technical parameters.

Electric circuit resistance is not more than 0.5 Ohm, the breaking strength of the sensor is 42kN in the horizontal plane and not less than 70kN in the vertical plane, the strength of not breaking the sensor in the horizontal plane is up to 22kN, the climatic index is UXK1 according to GOST 15050-69

The working principle of RSDCD is that the sensor bracket is broken when there are hanging parts in the movement structure, protruding from the lower gauge or when it falls off the rail [7-8].

As a result of sensor breakage, control devices are activated, which affects signaling, centralizing and blocking devices (SMB). At the same time, the bell rings on the control device of the station attendant or on the tunnel (bridge) alarm control panel, a red light is lit instead of a white light, and the external bell is turned on. The entry, crossing or blocking traffic light switches from the permissive indicator to the prohibitive indicator, the blocking traffic light gives a signal with a red light, the train driver is sent a message about the operation of the rolling stock control device through the train radio channel with the help of a voice informer [2].

The failure of the traffic structure stopped in front of the traffic light, the parts sticking out of the lower gauge, as well as the condition of the wheel pair coming off the rail, are eliminated by the working staff, and damage to the artificial structures and devices located in front and derailment of the moving train are prevented.

When approaching the stations, a device for monitoring the derailment of the rolling stock is installed in two units to automatically determine the parts that go out of the lower dimensions and the wheel pair derailment [7].

RSDCD is built on the basis of a control sensor with a metal conductor, a relay with a control and control circuit, which are not exempt from certain shortcomings. The functional capabilities of such rolling stock derailment control devices are limited, and when the failures are analyzed, the small cracks formed in the structure of the metal conductor in the control sensors made of the metal conductor that formed the lower gauge contour are one of the main and very big problems, as a result of increasing the strength of the metal, small cracks are always formed. , and increasing the strength of the metal, in turn, in certain situations, the wagon wheel pairs derailed the sensor which is a serious

drawback. In addition, one of the serious defects is the formation of a rotating electric circuit as a result of the external environment in the metal sensor that performs the function of transmitting electric current, this rotating electric circuit occurs as a result of the falling of current-carrying bodies and metallic waste from the brake pad into the metal structure of the sensor [8].

Developed method. Derailment control devices are one of the main devices for ensuring traffic safety. The main task of the non-contact vehicle derailment control device consists of an infrared light receiving-transmitting (AB, CD, EF) sensor and an electromagnetic track sensor installed to form the bottom gauge contour . On the basis of contactless network, with the help of infrared under-gauge sensors, it is possible to determine the condition of the under-gauge or off-gauge content or the derailment of the moving content by means of the method of light (light) transmission and reception (generation) by means of infrared sensors, and this system is economical, reliable, safe and The railway is one of the main devices for ensuring the safety of train movement. Based on the method of generating infrared light on the basis of a non-contact microprocessor network, as well as automatic detection of parts of the movement and cargo that go beyond the lower gauge, localization of systems (devices) for the detection and control of railway movement derailment, and "Uzbekistan temir yollari" JSC road management and This system (device) has been newly developed in order to adapt to signaling and communication network systems. The structural diagram of the vehicle derailment control device is shown in Fig. 3. The developed non-contact vehicle derailment control device can work like systems developed abroad. This newly developed non-contact device is designed for the weather conditions of our country, as well as for high-speed rail transport routes[1]. The scheme of the proposed non-contact RSDCD control sensor is shown in Figure 2 below.

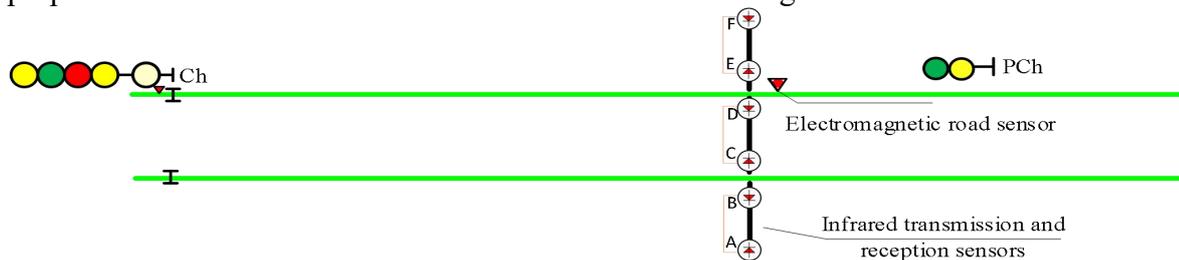


Fig. 3. Structural scheme of the RSDCD control sensor using infrared sensors in semi-automatic blocking

The developed non-contact control sensor consists of infrared sensors and electromagnetic road sensors, which simultaneously ensure traffic safety and automatically detect and control the parts of the rolling stock in railway sections that go off the track and from which side they go out of the lower gauge. serves. It has extended functional possibilities for the device for monitoring the movement of the moving composition using a light beam system based on the contactless network of the lower dimension of the moving composition , and is resistant to malfunctions, external influences and destruction. It is distinguished by low power consumption and stable operation of rail chains. The control unit is designed to operate at 220 V variable voltage, its internal blocks are powered by constant 12 V and 9 V voltages [5].

It is a non-contact device for detecting and monitoring railway rolling stock derailments and wheel pairs of rolling stock and parts of rolling stock (in a train) protruding from the lower gauge , and exchanging information about the state of the device, controlling infrared sensors and electromagnetic road sensors in terms of traffic safety. , as well as if the derailment control device is located in the approach section of the semi-automatic interlocking peregion if there is, it is additionally intended for the possibility of starting the traffic control device through electromagnetic road sensors and the

possibility of determining the vacancy of the section, as well as providing information about the state of the equipment located in the traffic control device.

Chromium metal conductor, which acts as a lower gauge contour in the system, detects the derailment of the rolling stock and the parts of the rolling stock and the load that go out of the lower gauge, regardless of whether the undersize is detected or not. provides transmission through and the moving content is stopped at the entrance to the station and in front of the artificial structure.

Based on the modernized contactless network, it is possible to determine the details of the derailment of the wheel pairs or the falling of any wagon, and when the underdiameter of the device is detected, the underdiameter is determined in which part of the car in which the underdiameter occurred using infrared sensors, and the underdiameter is detected by counting the axles of the movement using electromagnetic track sensors. it is determined on which axle the rolling stock of the wagon is located, and then the received information is transmitted to the centralization post via a wireless network, and the moving content is stopped at the entrance traffic light or at the crossing traffic light when entering the station. This non-contact device can be used on autonomous and electric traction main railway sections. RSDCD system based on this contactless network can be used together with devices in other railway automation and telemechanics systems [5].

Today, with the development of digital technologies, it is impossible to imagine control and management devices without software for ensuring the safety of train movement at railway stations. Software for microprocessor control in C++ programming language was created for a contactless network-based moving content sub-gauge light beam generating device. The software-based wireless network is capable of receiving information from infrared sensors and electromagnetic road sensors in time, ensuring their interdependence, and converting the received data into digital signals through the wireless network at the same time to the station attendant (ARM-RSA) and electromechanical (ARM-ShN) enables output to an automated desktop monitor.

On the example of Peregon semi-automatic blocking system, the structural scheme of the traffic control device was developed, where 3 (A- B, CD, EF) infrared transmitters and receivers are used to form the bottom gauge contour. gauge sensors are installed on a special wooden crossbar and 1 electromagnetic road sensors are installed on the rail, they detect the approach of the rolling stock to the derailment control device through the sensing element with the approach of the flange of the axles of the wheel pair, that is, the current flowing through the track sensor coil approaches zero, and the road sensors are wired information about the state of zero current flow to the microprocessor control cabinet through the network transmits. As soon as the axles of the first pair of wheels enter the approach section, the electromagnetic road sensor (next to the warning traffic light), in addition to checking the vacancy of the approach section, as a result of data transmission to the control cabinet on the basis of a wired network, activates the infrared transmitter and receiver lower gauge sensors and creates a lower control gauge contour. does[1-5].

Results. Derailment of wheel pairs of the rolling stock or parts of the rolling stock (in the train) protruding from the lower gauge and when the underdiameter of the device is detected, in which part of the wagon where the underdiameter condition is detected, the wheel pairs of the rolling stock, the wagon which axis of the motion structure of the suspended parts is determined by means of electromagnetic path sensors, and the position of the parts hanging and crawling in which part of the wagon belonging to this axis is determined using 3 (A- B, CD, EF) infrared transmitting and receiving sub-gauge sensors placed to form a sub-gauge contour for the sub-gauge. All these processes are directly and indirectly detected and controlled by a microprocessor control cabinet with software.

Conclusion. With the help of the developed non-contact network, it is possible to use the device for automatic detection of the parts that are out of the lower gauge in the railway rolling stock, the rolling stock parts are not crawling or the wheel pairs are not leaving the railway track, on autonomous

traction and electric traction railway sections. A method of control and control of non-contact rolling stock on the railway section by centralizing derailment control devices has been developed. By using infrared sensors and electromagnetic path sensors to create a lower gauge contour of the system, it is possible to reduce the cost of electricity and other costs in production by using infrared sensors without metal conductors.

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